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Assessment of Conservation Management of State Parks, Community and Private Conservancies in Kenya

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Abstract

The study compared the management of state-owned parks, community and private conservancies in five conservation areas. The objectives of the research were to assess the degree of community involvement in conservation management and analyze the public benefits and costs associated with conservation areas at the Coast, Southern, Central Rift and Mt. Kenya regions. A purposeful sampling of populations along the 5 km buffer zone was undertaken. The data collection techniques used questionnaires, one-on-one interviews, observation and existing secondary data. The SPSS was used for data analysis. The following variables were tested for correlations and associations; types of resources and practiced land use, diminishing resources and practiced land use, types of conflicts and types of resources, types of animals and types of resources. Results indicated that farming (31.8%) was the preferred type of land use followed by farming and livestock keeping (21%), and livestock keeping (18.4%), among other activities. Pearson's Chi-square noted a degree of association between the types of resources and practiced land use, the types of resources and land ownership, the diminishing resources and the type of resources and conflict of resources, the means of sustaining family and disadvantages of living next to the park. There was a positive significant correlation between the type of conflict and conservancy benefits ($r = 0.201$, $p < 0.000$, $n = 659$) at 0.05. Most communities preferred community and private conservancies based on conflict resolution measures, compensation for damages, economic benefits, and community involvement in decision making and sharing of resources within conservation areas.

Subject Areas

Environmental Sciences

Keywords

Conservation, Conflicts, Management, Resources

1. Introduction

Involving communities in conservation would enhance biodiversity, reduce conflicts such as water, grass, land, human-wildlife and human-human conflicts, and increase benefits through; eco-tourism, community projects and other businesses. The state-owned parks managed by the Kenya Wildlife Service (KWS), and the private and community conservancies were compared in five conservation areas to assess conservation management styles, community perception, resource conflicts and state of resources in wildlife conservation areas. The conservation areas for the research were Coast, Southern, Central Rift and the Mountain conservation area (Plate 1). The Ministry of Higher Education Science and Technology (MOHEST) approved the research by issuing the Research Permit No. MOHEST 13/001/38C 674.

The conservation regimes were; state parks, and private and community conservancies. These conservation areas represent unique ecosystems and form three-quarters of the country's conservation areas as shown in Table 1.

Table 1. Brief descriptions of the five conservation areas in Kenya.

Serial Number	Conservation Area	Flora, Fauna and Landscapes	Local communities	Socio-economic activities
1.	Coast Conservation Area 1) Shimba Hills National Park 2) Mwalughanje Elephant Sanctuary	Dinosaur Cycads, Baobab trees, Sable and Roan Antelopes, African Elephants, Giraffes, Leopards (KWS, 2010) [1]	Digo, Duruma, Kamba, Taita and other immigrants	Farming, livestock keeping, Conservancy, Commercial activities
2.	Tsavo Conservation Area 1) Tsavo East and West National Parks 2) Rukinga Wildlife Sanctuary	Forests, Shrubs, Thickets, Riverine vegetation, Deciduous woodlands, African Elephants, Mane-less Lions, Landscapes (Wijngaarden and Engelen, 1985) [2]	Taita, Taveta, Duruma, Somali, Chagga	Farming, Livestock keeping, Conservancy, Commercial activities
3.	Southern Conservation Area 1) Amboseli National Park 2) Kimana Community Wildlife Conservancy	Forests, Acacia woodlands, Shrubs, Thickets and Swamp vegetation, African Elephants, Wildebeest, Zebra (McLaughlin *et al.* 1973) [3] (Makonjio, 2009) [4]	Maasai, Kamba, Kikuyu, Chagga, Meru, Taita	Farming, Livestock keeping, Conservancy, Commercial activities

Continued

4.	Central Rift Conservation Area 1) Lake Nakuru National Park 2) Soysambu Conservancy 3) Malewa-Kigio Conservancy	Forests, Shrubs, Thickets, Riverine vegetation, Flamingo, Bufallo, Zebra, Rothschild giraffe, Gazelles (KWS, 2001) [5] Ramsar sites	Kalenjin, Kisii, Maasai, Kikuyu, Kamba, Luhya, Luo, Meru	Farming, Livestock keeping, Conservancies, Commercial activities
5.	Mountain Conservation Area 1) Mt. Kenya National Park 2) Ol Pejeta Conservancy 3) Il Ngwesi Community Conservancy	Forests, Moorland, Montane, Heath, Snow, Shrubs, Riverine vegetation, African Elephant, Black Rhino, Bongo, Chimpanzee (KWS, 1992) [6] (Graham *et al.*, 2009) [7]	Meru, Kikuyu, Maasai, Samburu, Somali	Livestock keeping, Farming, Conservancy, Commercial activities

The choice of State, private and community conservancies for this study was purposeful and was premised on the willingness of the management to participate in the research. According to the Kenya Law Report, 2009 [8], land outside protected areas is largely under the control of private owners and communities. Their cooperation is essential for the success of conservation activities, as the majority of these lands are subject to a multiplicity of uses, some of which conflict with wildlife conservation.

According to KWS (2010) [9], Conservancies contribute majorly to conservation and management of Wildlife and serve as breeding grounds, wildlife dispersal areas and corridors, protected area buffer zones, eco-tourism and recreation facilities, habitats for Wildlife and endemic species, education and research. Mackey *et al.* (2010) [10], asserted that among other things, a connectivity conservation approach recognizes that conservation management. United Nations Sustainable Development [1992] [11], advocates a natural resource management approach that ensures community participation which is to be achieved through government decentralization and devolution to local communities of the responsibility for natural resources held as commons.

The most important threat to biodiversity is ongoing degradation and loss of natural habitat, with more than half of the World's land surface now under human-dominated land uses (Mokany *et al.*, 2020) [12]. Retaining remaining natural habitat is a crucial response to limiting further extinctions, with recent proposals for post-2020 protected area targets of 30% of the planet by 2030. Kenya Law Report (Rev.) 2009 had more ambitious calls for protection of half the terrestrial biosphere by 2050. IPBES (2018) [13] states that effective monitoring strategies, verification systems and adequate baseline data—on both socio-economic and biophysical variables—provide critical information on how to accelerate efforts to avoid, reduce and reverse land degradation and conserve biodiversity. Land managers, including indigenous peoples and local communities, as well as experts and other knowledge holders, all have key roles to play in the design, implementation and evaluation of more sustainable land management practices.

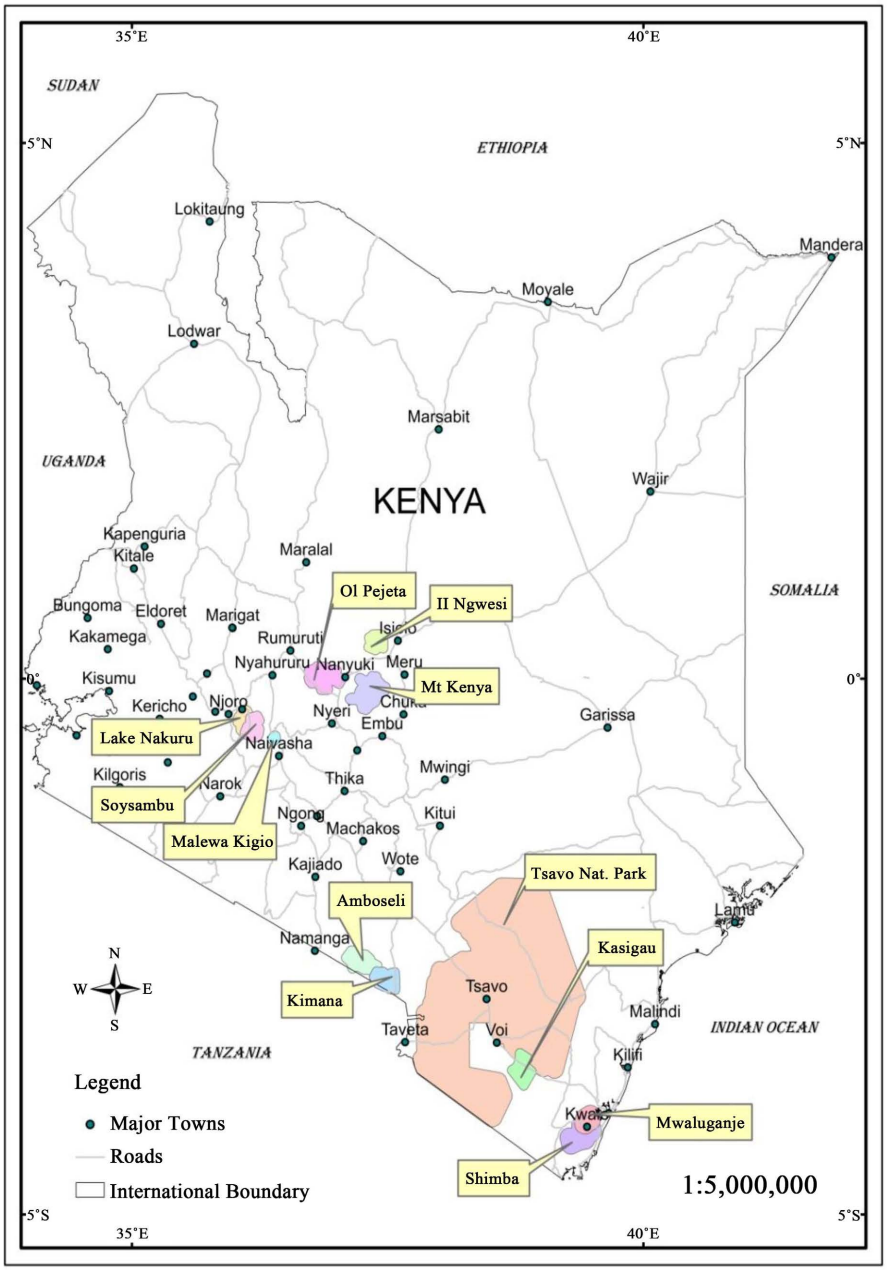

Plate 1. Location of the five conservation areas and regimes in Kenya: Source, Author (2012).

Community-Based Natural Resource Management (CBNRM) is simply the management of resources such as land, forests, Wildlife and water by collective, local institutions for local benefit Roe, Nelson, and Sandbrook (2009) [14]. Thakkadu (2001) [15], maintained that the involvement and participation of local communities in natural resource management and utilization will benefit conservation through; a reduction in land-use and natural resource conflicts, enhanced monitoring of the resource base, the provision of cost-effective options for management of Wildlife and the linking of natural resource conservation with development. Community conservancies represent one of several pio-

neering environmental governance approaches advanced by USAID/Kenya (USAID, 2013) [16]. The National Wildlife Strategy 2030, Ministry of Tourism and, Wildlife (2018) [17], indicates that, key to this strategy are programs to embrace the capacities of local communities and for mutual benefit of both the communities and the protected area managers. Currently, Kenya has 160 conservancies covering over six million hectares (11% of Kenya's land mass). These directly benefit over 700,000 households and directly employ over 4500 conservancy employees.

Just as wildlife is found throughout Kenya, wildlife and wildlife habitats are facing a suite of chronic and emerging challenges. Climate change, population growth, changing aspirations, poverty, pollution and invasive species, and unplanned development are all threats to biodiversity. According to the National wildlife census 2021 (Ministry of Tourism and Wildlife, 2021) [18], it is unlikely that majority of the wildlife species would coexist with livestock or in areas with high density of human settlements. Conflicts like crop raids, human-deaths and injury, property destruction and disruption of community social and economic life are destined to ensue in new crop farming and settlement areas. Efforts to develop spatial plans by county governments will help separate humans and wildlife or promote human-wildlife co-existence programs thereof.

In the National Wildlife Conservation and Management Policy, Ministry of Environment and Natural Resources (2017) [19], Kenya has 12.4% of its land under Protected Area system and less than 0.1% of the Coastal and Marine area. The protected areas dedicated to Wildlife protection in Kenya provide carbon storage of 241 Mt, a key contribution to the country's climate action (SDG 13). Habitat conversion and competition between Wildlife and livestock for pasture and water pose immense threat in Kenya. This has led to habitat loss, fragmentation and degradation associated with the land use changes, hence has denied space for Wildlife. Large areas previously available to Wildlife have been subdivided and converted to settlements or to other land uses not compatible with Wildlife such as agriculture. In addition, livestock grazing through the removal of biomass, trampling and destruction of root systems and replacement of wild grazers, affects rangeland biodiversity.

The Shimba Hills National Park is located in Kwale County and is approximately 30 Km South-West of the Coastal City of Mombasa. The Park occupies 24,000 Ha and is marketed as a landscape conservation area with beautiful sceneries, Coastal bush land, riverine forests and Coastal rainforest. It has a wide variety of different plant species and several Wildlife species including the endangered Sable antelope (*Hippotragus Niger*) (KWS, 2010) [1]. The neighbouring communities are the Digo, Duruma, Kamba and the Taita emigrants. These communities practice mixed farming. Mwalughanje Elephant Sanctuary (MES) was set up to protect 2428 Ha of traditional elephant migration route. The migratory routes range from sea level stands of Baobab trees along the Coast to the moist deciduous forests on the hills and the rainy forests along the Watercourses. The Sanctuary was started as a Wildlife enterprise in 1992 with 300

shareholders (Litoroh, *et al.*, 2000 [20] and Kamula, 2003 [21]). It was set up to reduce the human-elephant conflicts in form of crop destruction and loss of human lives. The Sanctuary is currently facing some challenges from the members of the community complaining of inadequate compensations due to low revenue collection (Litoroh, *et al.*, 2000) [20] and (Kamula, 2003) [21].

Tsavo East and West National Parks were established in 1948. The two parks occupy about 21,000 Km^2 with the remaining area being occupied by ranches. The Tsavo Conservation Area (TCA) holds a significant number of Wildlife populations, including Kenya's largest single elephant population, numbering about 12,000 animals (Ngene, *et al.*, 2011) [22]. Some of the mammals that are found in the Tsavo eco-system are African Elephants (*Loxodonta Africana*), the Mane-less Lions (*Panthera leo*), about 500 recorded bird species such as the rare Somali Ostrich (*Struthio camelus molybdophanes*) Wijngaarden and Engelen, 1998. Rukinga Wildlife Sanctuary, occupies 32,374 Ha and forms an important corridor for migration and dispersal of large mammals. It supports a significant concentration of African elephants with as many as 1500 using the corridor either as dispersal and feeding area or to move between the Tsavo East and West National Parks seasonally. There are estimated to be approx. 35,000 people within 5 Km of the ranch boundary (Wildlife Works, 2008) [23].

The Amboseli Ecosystem is known Worldwide as one of Kenya's greatest conservation areas and is recognized as a landscape where humans, livestock, and Wildlife have co-existed for centuries. It was given the status of a Biosphere Reserve by UNESCO in 1991 (Ministry of Education, 2011) [24]. It has a variety of ecological zones, which include natural dry Mountain Forest, savannah rangelands, wetlands and swamps. These areas are home to a wide variety of species, including elephants, lions and giraffes. Revenue generation for the National Park has had a general annual increase over the past 10 - 20 years. Biodiversity is central to many cultures and culture itself plays a crucial role in how biodiversity is perceived and managed, UNESCO, 2019 [25]. Tourism as one of key economic activities is increasingly embracing eco-tourism. The transition and buffer zones, have witnessed changes through group ranches being sub-divided and converted into crop farming. Other agribusiness enterprises including horticulture and floriculture have emerged because of infrastructural improvement. The Kimana Community Wildlife Sanctuary is the first community owned and managed Wildlife sanctuary in Kenya which is viewed as a flagship that shows local community involvement in tourism enterprises (Makindi, 2016) [26].

Lake Nakuru National Park is located at 360˚05'E and 0˚240'S. In 1964, the bird sanctuary extended to cover the lake and the shoreline while in 1968, the lake and the shore covering 6000 Ha was officially gazetted as a National Park. The park lies in the Rift Valley bottom or lowland and is bordered to the North by Menengai crater, to the East by Bahati escarpment, to the South by Eburru Escarpment and to the West by Mau escarpment. The lake and the catchment area, is rich in a variety of habitats and it is a Ramsar site (KWS, 2001) [5]. Soysambu Conservancy is located in the Central Rift Valley (036˚23'E 00˚46'S)

which is part of Africa's Great Rift Valley.

Lake Elementeita is the 5th Ramsar site in Kenya enlisted as a wetland of international importance in June 2005 mainly due to its role as a refuge for threatened, vulnerable and endangered species of birds (Soysambu Research, 2008) [27]. Malewa-Kigio Wildlife Conservancy covers 1416.40 Ha and it is situated in the Rift Valley between Nakuru and Naivasha in Kenya. The conservancy is privately owned but it incorporates the neighboring communities in a Co-operative society. The communities are involved in sustainable environmental management. The conservancy has an eco-lodge, Malewa river lodge and camp site to provide accommodation to visitors (Ecotourism Society of Kenya, 2005) [28].

The Mt. Kenya National Park (58,870 Ha) was demarcated within the Forest Reserve's upper zone above 3200 m Above Sea Level in 1949 and placed under the management of the Game Department. It was the third National Park to be gazetted in Kenya after Nairobi 1946 and Tsavo National Park 1948. The Sirimon and Naro Moru extensions (12,640 Ha) were later added in 1968, bringing the size of the National Park to 71,510 Ha (KWS, 2010) [1]. Considerable resources and efforts have been invested in improving the management of the protected areas of Mt. Kenya ecosystem (MKE) in the past years. The resource depletion and degradation are mainly due to unsustainable use levels and patterns as a result of poverty, rapid rural population growth, poor or inappropriate management skills and weak management institutions and systems. As resources become scarce on private and community lands, the population turns to the neighbouring protected areas for livelihood resources.

The Ol Pejeta Conservancy (OPC) covers 370 Km^2 or 36,421 Ha of savanna on the Laikipia Plateau, in North-Central Kenya, and at N 0˚00' - E 36˚44' to 36˚59' S0˚02'. It has an astounding variety of animals including the non-indigenous chimpanzees (*Pan Troglodytes*) and the big five (the endangered black rhino, leopard, elephant, buffalo and the lion). It is also the biggest Black Rhino (*Diceros bicornis*) Sanctuary in East Africa. Irrigated small-scale farming occurs on densely settled smallholder land to the East and Southwest of OPC (Omondi, *et al.*, 2002) [29]. The conservancy holds the largest single herd of pure Boran cattle in the World. It uses the integrated model of conservation where livestock and Wildlife are reared. The conservancy has Community Outreach Programs focusing on health, education, water, roads, agricultural extension and community based eco-tourism.

Il Ngwesi Group Ranch (IGR) which is also known as (Il Ngwesi Community Conservancy) lies between 0˚16' and 0˚25'N and 37˚17' to 37˚26'E (Harrison, 2001) [30]. This group ranch consists of 8645 Ha of community managed land located in Mukogondo Division, Laikipia District, North of Mount Kenya (UNDP, 2012) [31]. The ranch was established in 1995 with the aim of producing extra income from tourism and regenerating Wildlife populations with the assistance of Lewa Conservancy.

The core area has a radius of 5 Km^2 while the buffer area totals 6000 Ha.

Grazing in the buffer area is regulated and is not permitted after the rains to allow good grass growth (http://ilngwesi.com/content/visit/).

2. Materials and Methods

2.1. Study Design

The purpose of this research was to assess the public acceptance of wildlife conservation areas in Kenya. Quantitative and qualitative data were used for this study. The following variables were used for household data collection and analysis; type of resources, diminishing resources, conservation of resources, benefits of managing resources, resource conflicts, best land use for the area and stakeholder involvement in decision making. Purposeful sampling was used along the 5 km buffer zone from the conservation area boundaries.

Sample size calculation: Purposive and simple random sampling techniques were used for getting data. Data on community characteristics and land use and land cover was confined to a 5 km buffer zone of each of the conservation areas. The sample size was calculated using the formula by (Kothari, 2004), which was derived as shown:

$$n = \frac{\dfrac{p(1-p)}{\dfrac{e^2}{Z^2}} + p(1-p)N}{R}$$

where:

n = sample size required;

N = number of people in the population;

P = estimated variance in population, as decimal: (0.5 for 50-50);

e = Precision desired (5%);

Z = based on confidence level: 1.96 for 95% confidence;

R = Estimated Response rate (75%).

Substituting these values, the following is deduced:

$$n = \frac{Z^2 p(1-p)N}{e^2(N-1) + Z^2 p(1-p)} \Big/ R$$

The population of the five conservation areas was 57,428, sample size was 8523 while actual total of the respondents interviewed was 651.

2.2. Subjects & Selection Methodology

Five conservation areas were sampled out of eight conservation areas as listed by the Kenya Wildlife Service. Three conservation regimes were considered in each conservation area namely state managed parks, private conservancies and community conservancies. However, due to logistics and in some instances lack of willingness by target regions to participate in the research not all the studied areas had the three management regimes. Households were used as the basic research units and the head of the household was the main respondent. Each conservation regime in the five conservation areas was referred to as a 'study site'

where most households falling within the buffer zone were interviewed.

2.3. Procedure Methodology

Research permits were obtained from the Ministry of Higher Education Science and Technology (MHEST) and also the Kenya Wildlife Service (KWS) to allow entry into the parks, Appendix 1 and Appendix 2. Data collection techniques involved the use of questionnaires, interviews, observation and existing secondary data. The questionnaires were structured with closed ended and checklist options for household surveys. Direct observations were used to clarify information from the respondents.

The overall key themes identified and used for data collection on household survey were on: 1) community characteristics, type of resources, diminishing resources, conservation of resources, benefits of managing resources, resource conflicts, best land use for the area and stakeholder involvement in decision making, 2) for resource access and sharing were; type of land use practiced, land ownership, types of resources, sharing of resources and diminishing resources, 3) public benefits and costs associated with conservation areas were; problems experienced from wild animals, types of conflicts, type of animal, conservation benefits and expected solutions, 4) community involvement in conservation management was assessed using conservation of resources, management of environmental resources, stakeholder input and environmental awareness.

2.4. Statistical Analysis

The data analysis for household surveys was to test the hypotheses that; there is no relationship between resource access and sharing; there are no disadvantages of living next to conservation areas and stakeholder involvement is not beneficial to conservation. The overall respondent data was analysed using the Statistical Package for the Social Sciences (SPSS 9.0). The SPSS was used to perform tasks such as data entry and coding, frequencies, descriptive analysis, inferential statistics such as the Pearson's Correlation and Chi-square tests and Wilcoxon Signed Ranks Test.

Correlation and tests for associations, Wilcoxon Signed Ranks Test was used to test these variables; type of natural resources, diminishing resources, conservation of resources, benefits of managing resources, resource conflicts, type conflicts, type of wild animal, conservancy benefits, community view on conservation areas, disadvantages of living next to the park, conflict resolution, conservation knowledge, resource management, know benefits of managing resources sustainably, conservation of the environment, stakeholder communication, stakeholder input, community welfare, visitor facilities, environmental awareness, best land use for the area and Park management relationship with the communities. Comparisons were between the conservation areas and the management regimes. Data was analysed using SPSS version 20 (SPSS Inc., Chicago, IL). Student's *t*-test was used to ascertain the significance of differences between mean values of two continuous variables and confirmed by nonparametric Mann-Whitney test.

In addition, paired *t*-test was used to determine the difference between baseline and 2 years after regarding biochemistry parameters, and this was confirmed by the Wilcoxon test which was a nonparametric test that compares two paired groups.

Chi-square and Fisher exact tests were performed to test for differences in proportions of categorical variables between two or more groups. The level $p < 0.05$ was considered as the cut-off value or significance. Pearson's correlation was used to measure how variables or rank orders are related. Nominal and Ordinal variables were used for frequency counts and associations using Pearson's Correlation. The following variables were tested for correlations; type of resources and practiced land use, diminishing resources and practiced land use, type of conflicts and types of resources, type of animal and type of resources. The relationship of these variables informed on whether negative or positive changes influenced or affected the other variables.

The Pearson's Chi test square was used to assess the degree of association of the following variables; types of resources, practiced land use, land ownership, diminishing resources, means of sustaining family, problems and benefits of living next to conservation areas, type of conflict and type of wild animal attacks. The association of variables was instrumental in identifying the causes of diminishing resources and conflicts. Wilcoxon Ranks Test was used to assess the difference between population means of paired data on community perception on conservation management, disadvantages of living next to conservation areas and the effect of practiced land use on existing resources. The one-way Analysis of Variance (ANOVA) was used to compare variables between study sites and to test for significant difference between means for the four hypotheses.

3. Results

The analysis on benefits and costs in the five conservation areas indicated that 28.4% of the communities benefited from eco-tourism related activities such as sales from baskets, handmade soaps, elephant dung paper and bead-works. Twenty five percent (25%) of the respondents benefitted from community projects such as schools, boreholes, tree seedlings, health centres and tour guides. However, 33% and 20% of the respondents identified crop destruction and human deaths respectively, as the main type of problems from conservation areas. Thirty one percent of the respondents identified human-wildlife conflict while 7% experienced human-human conflicts.

The conservation benefits and costs from the three conservation regimes indicated that 31% of the respondents living next to KWS Parks benefited from the respective eco-tourisms, 18% from community projects such as schools, boreholes and health centres, 13% from infrastructures such as roads, 7% from business activities selling curios to tourists and 30.9% from other benefits such as employment. Five percent of the respondents living next to private conservancies benefited from eco-tourisms, 41% benefited from community projects, 20% from infrastructures developments, 6% businesses and 12% other benefits. Forty

three percent (43%) of the communities bordering community conservancies benefited from the eco-tourisms, 35% from community projects, 6% from infrastructures, 3% from businesses and 12% from other benefits (Figure 1).

The local communities experienced various problems in the three conservation regimes. The human-wildlife conflict was the main type of conflict in all conservation areas, followed by water and grass conflicts. The elephants, buffalos, lions and leopards were the main types of animals that attacked communities and affected their livelihoods across the three conservation regimes. Most of the respondents preferred compensation by the conservation area managements which is classified as death of humans or live stocks, various body injuries or crop destructions. Most of these conflicts resulted from the diminishing resources as shown in Figure 2.

The sharing of benefits was considered as the best solutions to human-wildlife conflicts in the three conservation regimes. The specific management regimes in the five conservation areas exemplified variation in the types of conflicts, conservancy benefits and expected solutions from the communities. Fifty percent,49% and 47% of respondents living next to Shimba Hills, Mt. Kenya and Amboseli National Parks respectively experienced crop destruction. Fifty eight percent and 46% of the respondents at Malewa and Kimana Community Conservancies respectively also reported crop destruction as the main type of problems experienced from the conservation areas. Seventy-one percent of the respondents bordering Soysambu Conservancy reported that human death was the main problem experienced from the conservancy. There were both disadvantages and benefits experienced from these conservation areas to the communities, however, the magnitude and level of benefits was influenced by the respective management regime in each area.

Sixty four percent (64%) of the respondents in five conservation areas were involved in conservation of resources. By conserving forests, 26% of the respondents living next to KWS parks benefitted from favourable weather, 35% of the respondents benefited from source of firewood while 20% benefitted from tourism. Forty six percent (46%) of the respondents indicated that the conservation area management involved them in decision making while 52% were not involved. Sixty seven percent (67%) of the respondents were aware of the environmental issues while 33% were not aware (Table 2). Thirty two percent (32%) and 45% of the respondents living next to private conservancies benefitted from favourable weather and firewood respectively. Thirty eight percent (38%) of the respondents living next to community conservancies benefitted from tourism. Overall, sixty two percent (62%) of the respondents living next to KWS Parks and 64% living next to private parks were not involved in decision making. Seventy nine percent (79%) of the respondents living next to community conservancies were involved in decision making.

The community environmental awareness indicated that 66% of the respondents living next to KWS Parks, 54% next to private conservancies and 71% living next to community conservancies were aware of environmental issues.

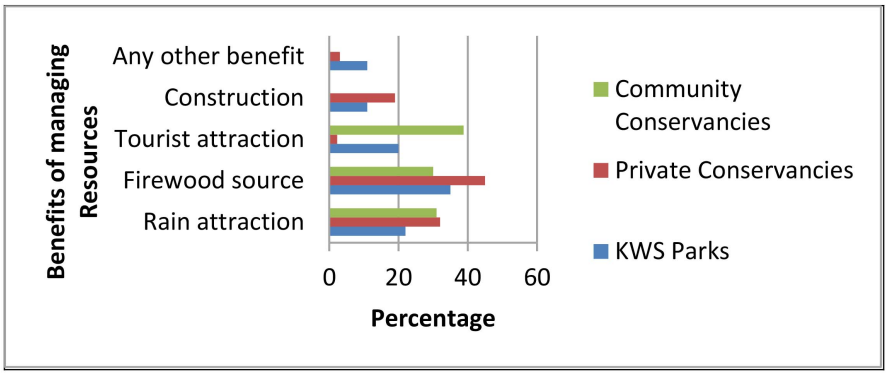

Figure 1. Benefits of managing environmental resources in conservation regimes.

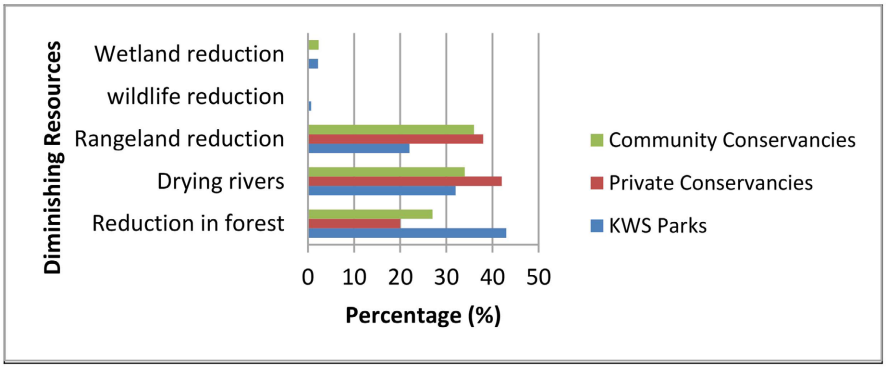

Figure 2. Identification of diminishing resources by communities in the conservation regimes.

Table 2. Community involvement in conservation management in percentage.

Conservation areas	Conservation Knowledge		Benefits of conservation					Stakeholder input		Environmental awareness	
	Traditional knowledge	Conservation	Rain attraction	Firewood source	Tourist attraction	Construction	Any other	Yes	No	Yes	No
Shimba Hills NP	37.5	62.5	15	27.5	22.5	17.5	17.5	67.5	32.5	75	25
Mwalughanje Elephant Sanctuary	54.8	45.2	19.4	19.3	61.3	0	0	64.5	35.5	83.9	16.1
TsavoEast & West	36.7	63.3	12.7	34.2	11.4	17.7	24.1	53.2	46.8	55.7	44.3
Rukinga Wildlife Sanctuary	51.2	48.8	12.2	53.6	7.3	17.1	9.8	34.1	65.9	53.7	46.3
Amboseli NP	46.3	53.7	43.9	31.7	24.4	0	0	51.2	48.8	75.6	24.4
Kimana Community Conservancy	50	50	44.1	29.4	26.5	0	0	58.2	41.2	73.5	26.5
Lake Nakuru NP	22	78	22	29	17	14	18	24	76	69	31
Soysambu Conservancy	26.2	73.8	61.3	22.6	0	16.1	0	32.3	67.7	32.3	67.7
Malewa-Kigio Conservancy	32.3	67.7	51.6	38.7	9.7	0	0	100	0	74.4	22.6

Continued

Mt. Kenya NP	22	78	28	41	31	0	0	24	76	69	31
Ol Pejeta Conservancy	72.4	27.6	29.3	50	0	20.7	0	39.7	60.3	52.6	47.4
IL Ngwesi Conservancy	100	0	9.1	33.3	57.6	0	0	93.9	6.1	48.5	51.5

The Pearson's correlation test showed a negative correlation between conservancy benefits and disadvantages of living next to the park ($r = -0.183$, $p < 0.001$, n = 659) at 0.05 level. This could be due to an increase in problems from conservation areas which reduced the impact of conservancy benefits. Conservancy benefits and expected solutions has a significant correlation since the identification of conflict resolution measures could enhance benefits to communities ($r = 0.141$, $p < 0.000$, $n = 659$) at (0.05 level) and at 95% confidence level. The type of conflict and conservation benefits has a correlation of ($r = 0.201$, $p < 0.000$, $n = 659$) at 0.05 level. There is a symbiotic relationship between communities and benefits from conservation areas where there are no conflicts. An increase in conservancy benefits such as eco-tourism, community projects and infrastructures changes community's perception to Wildlife conservation. The type of wild animal attacks and conservation benefits has a negative correlation of ($r = -0.118$, $p < 0.000$, $n = 659$) at 0.05 level.

The local communities were not motivated to conserve Wildlife due to frequent attacks which resulted into retaliations by killing the animals. The increased animal attacks on people, livestock and crops overshadow any benefits accrued from conservation areas. Conservation knowledge and environmental awareness has a significant correlation of ($r = 0.155$, $p < 0.000$, $n = 659$) at 0.05. This enhances community conservation efforts and sustainable use of resources. Stakeholder's input and environmental awareness has a significant positive correlation of ($r = 0.310$, $p < 0.000$, $n = 659$) at 0.05. This indicates that community involvement in decision making improves the acceptability of environmental conservation.

The Pearson's Chi-square tested the degree of association in the following variables; practiced land use and types of resources, types of resources and land ownerships, diminishing resources and types of resources, means of sustaining families and conservancy benefits, types of conflicts. The Chi-square results indicates that the types of land use practices have an association with the types of resources available ($x = 35.905$, df = 16, $p = 0.003$). The types of land use preferred by the respondents such as farming, livestock keeping, conservancies or commercial activities were associated with the types of resources available. The resources available influenced the types of livelihoods practiced by the communities. Diminishing resources has an association with types of resources ($x = 17.630$, df = 16, $p = 0.346 > 0.05$). This is due to competition and overuse of available resources.

Means of sustaining families also has an association with disadvantages of liv-

ing next to the park ($x = 34.108$, df = 8, $p = 0.000$) which influences the types of conflicts due to competition for existing resources. Stakeholder's inputs and benefits of managing resources have an association ($x = 3.095$, df = 4, $p = 0.542 > 0.05$). Communities' involvement in decision making creates awareness on the benefits of Wildlife conservation. Environmental awareness has no association with conservation knowledge ($x = 6.202$, df = 4, $p = 0.185 > 0.05$). This data however, does not provide enough evidence on lack of association between environmental awareness and conservation knowledge. Moreover, stakeholder's involvements and environmental awareness contributes to an increase in benefits of conservation. The community conservancies that were well managed were Il Ngwesi and the Malewa-Kigio conservancies.

4. Discussion

In the five conservation areas the analysis on benefits and costs indicated that 28.4% of the communities benefited from eco-tourism related activities such as sales from baskets, handmade soaps, elephant dung paper and bead work. Twenty five percent (25%) of the respondents benefitted from community projects such as schools, boreholes, tree seedlings, health centres and tour guides. However, 33% and 20% of the respondents identified crop destruction and human deaths respectively, as the main type of problems from conservation areas. Thirty one percent of the respondents identified human-wildlife conflict while 7% experienced human-human conflict. Generally, twenty three percent (23%) of the respondents identified the elephant as the main type of animal that caused human-wildlife conflict, while 5% identified the lion. Fifty three percent (53%) identified compensation as the expected solution while 29.6% indicated sharing of benefits from conservation areas. This indicated that, even as communities benefited from conservation areas; they also experienced problems emanating from conflict over resources.

The conservation benefits and costs from the three conservation regimes indicated that 31% of the respondents living next to KWS Parks benefited from eco-tourism, 18% from community projects such as schools, boreholes and health centres, 13% from infrastructure such as roads, 7% from business activities selling curios to tourists and 30.9% from other benefits such as employment. Five percent of the respondents living next to private conservancies benefited from eco-tourism, 41% benefited from community projects, 20% from infrastructure development, 6% business and 12% other benefits. Forty three percent (43%) of the communities bordering community conservancies benefited from ecotourism, 35% from community projects, 6% from infrastructure, 3% from businesses and 12% from other benefits. Sixty two percent (62%) of the respondents living next to KWS Parks and 64% living next to private parks were not involved in decision making. Seventy nine percent (79%) of the respondents living next to community conservancies were involved in decision making.

Type of conflict and conservation benefits has a correlation of ($r = 0.201$, $p < 0.000$, $n = 659$) at 0.05 level. There is a symbiotic relationship between commun-

ities and benefits from conservation areas where there are no conflicts. An increase in conservancy benefits such as eco-tourism, community projects and infrastructure changes community's perception to Wildlife conservation. Stakeholder input and benefits of managing resources has an association ($x = 3.095$, $df = 4$, $p = 0.542 > 0.05$). Stakeholder involvement and environmental awareness contributes to an increase in benefits of conservation.

Most of the community conservancies involved local communities in decision making. However, they were at different stages of implementing the management plans and communities received major economic benefits. At Il Ngwesi and Malewa-Kigio conservancies the management plans were fully implemented. The protected area regulations were in place and there was sufficient information for planning and decision making. The biodiversity at Kimana and Malewa-Kigio conservancies was predominantly intact. The private and community conservancies had an effective education and awareness programs and local communities received substantial economic benefits.

Communities living in the five conservation areas had different perspectives of the management of the Wildlife conservation regimes. The community and private conservancies were rated highly by communities due to stakeholder involvement, conflict resolution measures and economic benefits. The state-owned parks that had an effective management program were Tsavo East and West National Parks. Among the private conservancies, Rukinga Wildlife and Ol Pejeta conservancies were well managed. The community conservancies that were well managed were Il Ngwesi and the Malewa-Kigio conservancies.

5. Conclusion

Communities living in the five conservation areas had different perspectives on the management of the wildlife conservation regimes. The community and private conservancies were rated highly by communities due to their stakeholder's involvements, conflict resolution measures and economic benefits. The state-owned parks that had effective management programs were Tsavo East and West National Parks. Among the private conservancies, Rukinga Wildlife and Ol Pejeta conservancies were well managed.

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Conflicts of Interest

The authors declare no conflicts of interest.

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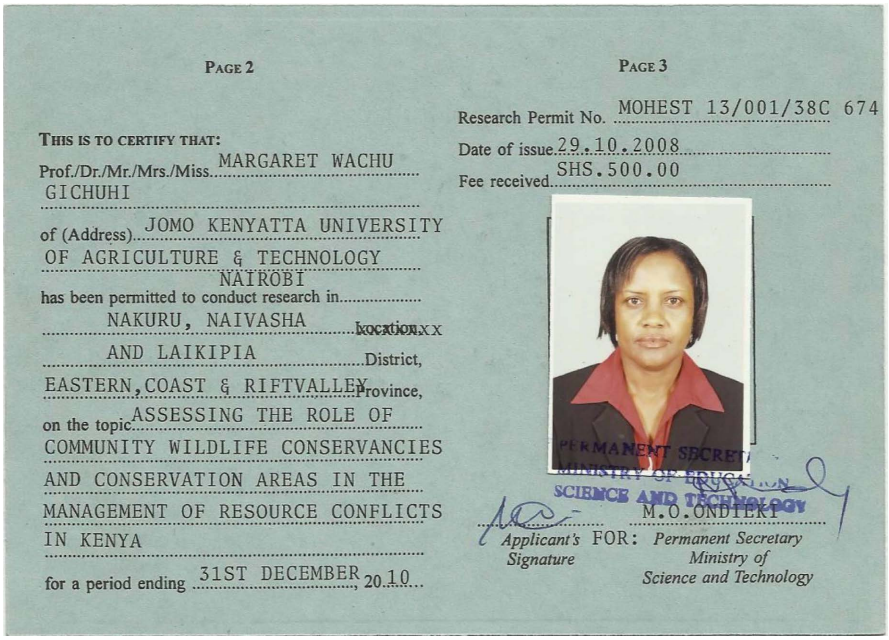
Appendices

Appendix 1. Ministry of Higher Education Science and Technology research permit.



PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss. MARGARET WACHU GICHUHI

of (Address) JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY NAIROBI

has been permitted to conduct research in NAKURU, NAIVASHA AND LAIKIPIA District, EASTERN, COAST & RIFTVALLEY Province,

on the topic ASSESSING THE ROLE OF COMMUNITY WILDLIFE CONSERVANCIES AND CONSERVATION AREAS IN THE MANAGEMENT OF RESOURCE CONFLICTS IN KENYA

for a period ending 31ST DECEMBER, 2010

PAGE 3

Research Permit No. MOHEST 13/001/38C 674

Date of issue 29.10.2008

Fee received SHS.500.00

PERMANENT SECRETARY
MINISTRY OF EDUCATION
SCIENCE AND TECHNOLOGY
M.O.ONDIEKI

Applicant's Signature

FOR: Permanent Secretary
Ministry of
Science and Technology

Appendix 2. Kenya wildlife service research permit.

Ref: KWS/4001

25th November, 2008

Margaret Wachu Gichuhi
Jomo Kenyatta University of Agriculture & Technology
P.O.Box 62000
NAIROBI

Dear Madam,

RE: REQUEST TO VISIT KWS NATIONAL PARKS FOR RESEARCH

You have been granted free entry to the following parks to enable you conduct your research on "Assessing the role of Community Wildlife Conservancies and Conservation Areas in the Management of Resource Conflicts in Kenya". You will therefore report to the Warden in charge of each Park or Reserve before commencement of research. While in the park, you will observe all park rules and regulations. In addition, you will adhere to research guidelines for conducting research in protected areas as stipulated by KWS. In particular: You shall

- Not collect any samples of any form of material without authority from the Director KWS or the Deputy Director BR&M.
- Not release any information, other than on your research, about the National Park/Reserve to any person or authority without the Director's authority.
- Leave the park upon completion of the research work.

At the end of your study we shall expect you to submit a copy of your thesis to KWS.

We wish you a successful research.

Yours faithfully,

Catherine Wambani
Senior Warden – Parks & Reserves

C.c. DDBR&M