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Public Participation and Human-Wildlife Conflict Management in Taita-Taveta County, Kenya

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Abstract

Human-Wildlife Conflict poses a threat to both human development and wildlife conservation. Due to rapid human population growth and over-dependence on agriculture, encroachment on wildlife habitats has become a major challenge that fuels HWC. This study sought to find out the relationship between public participation and HWC management in Taita-Taveta County, Kenya. The study was anchored on stakeholders' theory. The study was descriptive and was done in Taita Taveta county. A population of 15889 households within Mwatate Sub-County was targeted, with a Sample size of 375. A simple random sampling technique was used to determine the sample. Data were collected by the use of questionnaires featuring a combination of structured and unstructured questions. Regression analysis and Chi-square tests were conducted on the variables. The influence of public participation on Human-Wildlife Management had several proxies including knowledge of ongoing HWC management strategies. Regression analysis established that, as long as all other factors are held constant, per unit increase in the number of people who know the ongoing management strategies, the log odds of Human-Wildlife Management increase by 1.755. Knowledge of the ongoing management strategies, therefore, increases the chances of Human-Wildlife Management. The study concluded that the involvement of the victims can go a long way in promoting a positive attitude to HWC management and as well promote knowledge of ideal HWC mitigation measures. It is paramount to have all aggrieved parties front their aspirations and find a common ground in coming up with a resolution. In addition, participatory monitoring and evaluation should be deployed to ensure consensus on the results and outcomes of implemented strategies.

Keywords*: *Public Participation, Human-Wildlife Conflict Management, Taita-Taveta County

1.0 Introduction

The factors that affect HWC management should be understood by stakeholders for effective strategy implementation. Communities adjacent to protected areas perceive the government as the 'owners' of wildlife thus responsible for their management and accountable for mitigating HWC. However, the communities have a role in the fight against HWC. The poor success rate of HWC management efforts has been because of inherent factors within the local communities. This is something which had not attracted much attention in the academic field, thus no study had focused on the community's inherent factors that affect the implementation and success of HWC management strategies.

Furthermore, most HWC management studies focus on technical aspects ignoring the social dimensions of effective management of HWC. Noteworthy, HWC involves a complex social dimension that can only be addressed by involving the victims who mostly are the local communities and focusing on wildlife laws. Moreover, wildlife confinement in protective areas makes them more aggressive posing more risks to local people, enhancing negative attitudes towards wildlife. Unfortunately, most of the local households depend solely on farming for a livelihood, which ultimately gets disrupted by wildlife.

Human-wildlife conflict is a threat to both wildlife conservation and the well-being of humans living in subsistence-based or low-income communities, especially those bordering the protected areas (El-Hajj, Khater, Tatoni, Adam, & Errol, 2017). They represent a widespread, complex, and intractable challenge to conservation(Das, Lahkar, & Talukdar, 2012). All over the world, the ballooning human population has led to high demands for cultivatable lands and the conversion of forest habitats to human habitation and farmlands. This has led to fragmentation which has extremely affected the animal population thus increasing HWC. As a result, several activities have been undertaken, to mitigate HWC and promote the co-existence of humans and wildlife. The activities comprise a multi-dimensional project targeting the local people as the main stakeholders(Das et al., 2012).

According to Webber et al. (2007), as cited in (Hoffmeier-Karimi & Schulte, 2015), Crop raids in sub-Sahara Africa comprise a pervasive and economically damaging form of human-wildlife conflict, and crop losses to wild animals are considered the leading economic problem for areas bordering wildlands. Kangwana (1995), points out that African elephants are the primary cause of crop damage. In Africa Just as in Asia, wildlife habitat is being replaced by agriculture. Thus, wild animals are being squeezed into smaller areas of the remaining natural habitat which is surrounded by human activities and crops which are the favourites of wildlife like Elephants, who frequently raid and destroy the fields. According to (Parker, Osborn, Hoare, & Niskanen, 2007), HWC occurs in any wildlife range and has been experienced in most areas in Africa both savanna and forest situations where wildlife has been compressed into smaller areas and their traditional migration routes cut off. This leads to competition for scarce natural resources by both humans and wildlife.

In Rwanda, Nyungwe National Park (NNP), which is one of the largest remaining forest tracts in East and Central Africa and was designated as a national park in 2005 under Rwandan law, is surrounded by communities and households that depend on agriculture as the mainstay economic activity. Wildlife also crosses the boundaries raiding the small, cultivated farms prompting the shortage of food during the year, socio-economic instability, and considerable strain on the available natural resources. This has forced the Rwanda Development Board (RDB), to come up with a compensation program (2012) to ease the effects of HWC among the local communities. The compensation is done based on field pictures, assessment by an agronomist, and verification of claims by Conservation animators famously known as ANICOs for the compensating agency. This arrangement has been lauded to reduce HWC cases and the tensions associated with it (Gloriose, 2019).

In Kenya, wildlife interferes with primary school learning, where pupils have to walk long distances to school. Wildlife encounters, however, make them lose valuable school time with teachers being unable to complete the syllabus by exam time. Local people have therefore come up with coping strategies, like escorting pupils to school or embracing polygamous family units with one wife being settled near schools away from the HWC prone areas and vested with the responsibility of taking care of the school-going children for wives living in those areas, while others consider taking their children to boarding schools (W et al., 2012).

Despite all the efforts by the government to manage this problem, cases of HWC are on the rise hence threatening the livelihood of the local communities. According to Kigema (2003), KWS which is a mandated entity to manage wildlife in Kenya has done little to resolve the increasing HWC, and electric perimeter fences around parks have had little success. Whereas, HWC has been blamed for the rampant poverty and famine, as well as dismal school performance in many areas in Kenya, the conversation from local leaders, has been about compensation and the electric fence, which have been considered the major mitigation strategies.

Consequently, KWS which is a mandated entity to deal with wildlife in Kenya is said to have done little to resolve the increasing HWC and had severally been accused of using provisions of law to protect the wildlife but dragged when it involved compensation for HWC related cases. This has narrowed the focus of wildlife management to fight for compensation for HWC victims, who perceive wildlife as a liability and risky to their livelihoods. This study, therefore, purposed to find out the relationship between public participation and HWC management, to fill the lacuna in the knowledge that ensures healthy co-existence between wildlife and affected communities, especially those adjacent to PAs.

HWC Management

In many parts of the world, HWC has had negative impacts on the human and animal ecology, and as such impacting harmfully on human life and well-being. These impacts are not always obvious due to the ambiguousness of policy implementation. Visible impacts include loss of crops, property damage, physical injury, and fatalities to humans, while the less visible are particularly on the psycho-social soundness of rural areas. Indirect loss of income or food is compounded by a loss of psychological and physical health brought on by the stressors of protecting fields and homes(Desai & Riddle, 2015). Desai and Riddle(2015), reveals that 60 to 70 percent of the Indian budget for wildlife conservation is spent on HWC mitigation, but despite this, the conflict persists with deaths of humans raising. Approximately 500, 000 households in India have been reported to have fallen victims to HWC.

Meanwhile, in Indonesia, several local-based strategies are being considered in HWC management. Some of these include Chilli based deterrents which come in several forms which are either sprayed, launched as bomb-like smoke canisters, made in form of a chilli fence, or burnt to produce noxious smoke which repels the wildlife. During the experiments, it was revealed that it is possible to keep elephants off farms using unsophisticated tools and guarding techniques which can be voluntarily adopted by local communities if their effectiveness is demonstrated. There is a need for farmers to take responsibility for the safety of their farm products from elephants by desisting from the theory that centralized Animal control authorities will reduce the conflict(Hedges & Gunaryadi, 2010).

According to Webber et al. (2007), as cited in (Hoffmeier-Karimi & Schulte, 2015), Crop raids in sub-Sahara Africa comprise a pervasive and economically damaging form of human-wildlife conflict, and crop losses to wild animals are considered the leading economic problem for areas bordering wildlands. Jackson et al. (2008), observes that HWC solutions in Africa, target symptoms rather than the underlying causes. He further, recommended the modification of wildlife spatial use to reduce crop raiding in Botswana. They believe here that physical barriers would restrain wild animals' movements, whereby effective fencing schemes like chemical deterrents such as chilli peppers were recommended. In addition, the spatial distribution of wildlife was found to be manipulated by the provision of mineral licks as forage, soils, and water in sodium which attract wildlife like elephants. This was the case during dry seasons

when waterholes could be created away from areas where people live to reduce spatial overlap between them and the wildlife.

Jackson et al. (2008) further revealed that Land use planning influences HWC in a great way. He observed that given the increase of human population, land use and zonation need to be carefully planned to ensure that future human settlement patterns will consider wildlife habits.

In Laikipia, HWC plays out within a landscape that has been shaped by the struggle for land which has commonly been utilized by pastoralists. Roaming elephants in Laikipia created a major problem for farmers by raiding their crops, especially where their farms lie adjacent to protected areas. HWC in Laikipia involves both direct and indirect impacts of wildlife behaviours on people which include crops and property destruction, social disruption, and psychological trauma as well as impacts on elephants themselves which include injury and deaths(Evans & Adams, 2018).

Since then, HWC has been known to affect school attendance. Often pupils are unable to attend classes due to fear of encountering elephants and other wild animals on their way to school. Also, HWC has affected the economic livelihoods of their families hence they can't pay for their school fees and as a result, affect their performance and eroding the community's overall education level(Weinmann, 2018). Despite all the efforts by the government to manage this problem, cases of HWC are on the increase hence threatening the livelihood of the local communities(Mwamidi, Mwasi, & Nunow, 2014).

Meanwhile, illegal livestock herding in the National Parks has become a norm, hence creating unwarranted pressures on the landscape and resources, thus elephants are forced to move out in search of these resources for survival. Moreover, National parks act as safe zones for wildlife, and their long borders make wide areas vulnerable to HWCs. According to Kissui (2008), these conflicts bring about negative attitudes toward wildlife conservations and hence retaliatory killings (Mika Siljander et al, 2017). Anthony (2007), posits that HWC is a major threat to wildlife conservation since it turns the local communities against it, hence creating a paradox within this area where successful conservation has a likelihood to increase HWC which in turn has a negative influence on local attitudes towards wildlife conservation.

In, Taita Taveta people perceive the Tsavo parks as a liability, since very few have directly benefitted from wildlife proceeds and none of them could legally generate any revenue from the parks. According to (Kasiki, 1998), the local people could not understand why grazing, access to traditional shrines, and water within the parks were denied. This according to Kasiki, resulted in apathy towards wildlife conservation and lack of adherence as well as the frustration with wildlife regulations imposed by KWS(Smith, Smith, & Kasiki, 2015). Among measures that have been applied by KWS to control HWC in this area include; Problem Animal Control (Tsavo & Area, 2016), Translocation, and Relocation, which is the transfer or removal of Elephants to different habits, and Electric fencing (Smith et al., 2015).

Public Participation and HWC Management

According to Judith Syombua, (2013), Community participation is defined as "the involvement of local people in the identification, planning, and implementation of projects and programmes that they commit themselves to contribute towards the evolution and development". Involvement of local communities fulfills the important requirement of HWC being managed through other effective means and which focus on humans as well. This kind of involvement fosters participation which in turn enhances the co-existence of wildlife in -human-dominated landscapes (Judith Syombua, 2013).

Local people's perceptions of Wildlife are influenced by observable effects of HWC and cultural beliefs, all of which affect how any HWC mitigation strategies are implemented and received locally. Thus, local experiences and values when coming up with effective HWC mitigation strategies are critical(Weinmann, 2018). In a research done in lower Sagalla in Taita Taveta by Weinmann (2018), residents complained of elephants raiding their grain stores on top of their farms, hence endangering not only their lives but the food security. This in turn, negatively impacts perceptions and relationships of local people with the Kenyan government and KWS who are seen to value Wildlife more than local people. The rampant HWC cases make the local people feel that the government does not punish the wildlife. Moreover, they feel that the government does not fairly compensate them for HWC-related damage(Weinmann, 2018). Farmers interviewed believed that wildlife belongs to the government and hence the government should pay for damages incurred because of HWC. They also believe that the government benefits from wildlife through tourism that's why they are protecting and valuing them (Weinmann, 2018).

Prior to the use of modern wildlife management strategies, indigenous knowledge (IK) allowed local communities to conserve wildlife and other natural resources for future generations. Boafo et al. 2015 observes that several communities still rely on IK to conserve wildlife regardless of the innate limitations. Technology has ushered in a new era of wildlife management tools. while these tools have supported local communities in the conservation of natural resources including wildlife, such technologies have as well modified the perception of PAs by local communities, since they eventually influence the type of conservation policies. And as such, these tools could lead to the marginalization of local communities from natural resources(El-Hajj et al., 2017).

Active involvement of local communities and the use of Indigenous knowledge is very paramount in the management of HWC. Indigenous knowledge is defined as *"a cumulative body of knowledge, practices, and belief, evolving by adaptive processes, and handed down through generations by cultural transmission about the relationship of living beings with one another and with the environment"* (Berkes et al. 2005).

Although often considered primitive, indigenous knowledge plays a significant role in HWC management and wildlife management. For example, the Tukano community in Colombia still relies on indigenous knowledge for the preservation of species of locally found wildlife. Incorporating indigenous knowledge in HWC management will increase the effectiveness of the management strategies and as well promote healthy dialogue between all stakeholders(El-Hajj et al., 2017).

Taita Taveta local community has embraced some of the indigenous knowledge and skills to curb HWC. These include both destructive and un-destructive practices like the burning of Elephant dung, use of scarecrows, painting of primates, drum beating, and use of acacia mellifera (Mwamidi et al., 2014). Meanwhile, Taita-Taveta leadership feels that wild animals on private and communal lands should be trusted by the local people who should plan, manage and use them sustainably. (Mwamidi et al., 2014), argues that management of wildlife risks lack public support if they are not relevant to people's everyday life and concerns. Makindi, et al. (2014), observes that people who live in HWC-prone areas depend more on natural resources and thus find it difficult to tolerate wild animals in their lands as they consider them a threat to their lives and livelihood. where HWC solutions are not adequate, local support for wildlife conservation efforts gets eroded and reduced. Thus, public participation brings onboard skills and knowledge that will improve sustainability in HWC management around PAs.

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2.0 Methodology

The study was descriptive and was done in Taita Taveta county. A population of 15889 households within Mwatate Sub-County was targeted, with a sample size of 375 being established using Krejcie and Morgan, (1970). A simple random sampling technique was used to determine the sample. Data were collected by the use of questionnaires featuring a combination of structured and unstructured questions. Data was analyzed using regression analysis and Chi-square tests.

3.0 Results and Discussion

Several variables were used to show the effect that public participation has on Human-Wildlife Management. These variables were encapsulated by several questions which were: knowledge of the wildlife management strategies in place or ongoing, whether the participant is involved in any wildlife management process, whether the participant thinks that the community has a role to play in wildlife management and whether the community has initiated any wildlife management program or project.

Association and correlation between knowledge of any wildlife management strategies and Human-wildlife management

To check whether there was any effect of knowledge of any wildlife management strategies by the residents on Human-Wildlife Management, an association test was first conducted. The association test showed whether there was an association between the two interesting variables or not by comparing the Chi-square value obtained to the critical value of 3.841. The chi-square value obtained as shown in Table 1 was 10.118 with a P-value of 0.001. The P-value was extremely small thus showing that the chi-square value was statistically significant. The chi-square value obtained was larger than the critical value of 3.841. This conclusively revealed that there was sufficient evidence to conclude that there is indeed an association between knowledge of ongoing wildlife management strategies and Human-Wildlife Management. The correlation coefficient that was obtained was -0.267. This shows that there was a negative correlation between knowledge of ongoing management strategies and Human-Wildlife Management.

Table 1: Chi-Square Tests of association

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.118a	1	0.001		
Continuity Correction b	9.012	1	0.003		
Likelihood Ratio	10.066	1	0.002		
Fisher's Exact Test				0.002	0.001
Linear-by-Linear Association	10.047	1	0.002		
Pearson correlation	-0.267		0.083		

Association between involvement in any wildlife management process and Human-Wildlife Management

To check whether there was any effect of involvement in any wildlife management process by the residents on Human-Wildlife Management, an association test was first conducted. The association test showed whether there was an association between the two interesting variables or not by comparing the Chi-square value obtained to the critical value of 3.841. The chi-square

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value that was obtained as shown in table 2 is 3.201 with a P-value of 0.074. The chi-square value obtained was less than the critical value therefore there was no sufficient evidence to conclude that there is no association between involvement in any wildlife management process and Human-Wildlife Management.

Table 2: Chi-square test of association

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.201a	1	0.074		
Continuity Correctionb	2.063	1	0.151		
Likelihood Ratio	3.778	1	0.052		
Fisher's Exact Test				0.089	0.07
Linear-by-Linear Association	3.178	1	0.075		
Pearson correlation	0.151		0.061		

Association and correlation between community initiating a wildlife management program and Human-Wildlife Management

To check whether there was any effect of the community initiating a wildlife management program on Human-Wildlife Management, an association test was first conducted. The association test showed whether there was an association between the two interesting variables or not by comparing the Chi-square value obtained to the critical value of 3.841. The chi-square value obtained as shown in table 3 was 7.026 with a P-value of 0.008. This, therefore, shows that the statistical test was statistically significant since the P-value was smaller than 0.05. Furthermore, the chi-square value that was obtained was greater than the critical value of 3.841 thus providing sufficient evidence. The correlation coefficient obtained was 0.228. This, therefore, shows that there is a positive correlation between the initiation of community wildlife management programs with Human-Wildlife Management.

Table 3: Chi-square test of association

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.026a	1	0.008		
Continuity Correctionb	5.582	1	0.018		
Likelihood Ratio	8.631	1	0.003		
Fisher's Exact Test				0.008	0.006
Linear-by-Linear Association	6.974	1	0.008		
Pearson correlation	0.228		0.056		

Regression Analysis

A regression model was employed to explain the effects which public participation has on Human-Wildlife Management. The response variable was Human-Wildlife Management which was categorical with two levels: Human-Wildlife Management, no Human-Wildlife Management. The explanatory variables were knowledge of the ongoing management strategies, community involvement in any Wildlife Management Process, and initiation of a community Wildlife Management program. The explanatory variables were categorical with

two levels: Yes and No. The regression model thus used was the Binary Logistic regression model. The model equation is:

Log odds (HWC Management) = B1*knowledge of HWC Management strategies+B2*Community Involvement + B3*Initiation of programs by community+ Constant. B1, B2, and B3 are regression coefficients.

Table 4 reveals the regression coefficients of the model and their corresponding odd ratios.

Table 4: Modelling the effects of Public Participation on Human-Wildlife Management

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Knowledge of strategies (1)	1.755	0.453	15.028	1	0	5.781
	Community involvement (1)	-2.853	1.145	6.209	1	0.013	0.058
	Initiation of community programs (1)	-2.912	1.106	6.925	1	0.008	0.054
	Constant	-0.704	0.24	8.623	1	0.003	0.495

As long as all other factors are held constant, per unit increase in the number of people who know the ongoing management strategies, the log odds of Human-Wildlife Management increase by 1.755. Knowledge of the ongoing management strategies, therefore, increases the chances of Human-Wildlife Management.

4.0 Conclusion

The majority of the respondents claimed not to have been involved in any HWC management strategies and that the process is usually hijacked by village elites who cannot conclusively articulate issues burdening them. As much as this was not entirely true, the study revealed that the involvement of the victims in these can go a long way in promoting a positive attitude to HWC management and as well promote knowledge of ideal HWC mitigation measures.

5.0 Recommendations

In line with the stakeholders' theory by Freeman in 1984, who described an occurrence by its relationship with several groups and individuals affected by it. It is paramount to have all aggrieved parties front their aspirations and find a common ground in coming up with a resolution. This factor seems to have been overlooked or improperly implemented in the fight against HWC. There is a need, therefore, to bring all concerned parties in HWC management, who include the government agencies concerned with wildlife, natural resources, and land together with the very local community members who face the brunt of the conflict during their day-to-day activities plus other relevant private stakeholders like ranches and conservancies. The objective of such an arrangement is to work on a common ground for a fruitful HWC mitigation process. In addition, participatory monitoring and evaluation should be deployed to ensure consensus on the results and outcomes of implemented strategies.

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